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ON SOME FERNS FROM THE MALAY PENINSULA

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From Mr. R. E. Holttum, Director of the Botanic Gardens, Singapore, I have received in 1926 and 1927 two lots of duplicate specimens of ferns from the Peninsula. The specimens were of extraordinary interest to me, because I am now engaged in the determination of three very large collections of ferns from Borneo, in connection with a critical revision of the whole fern-flora of that large island, based on examination of type specimens received on loan from the leading herbaria in Europe and America. It soon became clear to me that the fern floras of Borneo and the Malay Peninsula are very intimately related, having a very large number of species in common. I found that some of the specimens from the Peninsula so kindly sent by Mr. Holttum were perfectly identical with others from Borneo, but in not a few cases different names were given to them.

In July 1926 Mr. H. N. Ridley published his large paper, "The Ferns of the Malay Peninsula" (*Journ. Malayan Branch, R. Asiatic Soc.*, 4, part 1), which work I have studied with considerable interest. It appears that Mr. Ridley has identified the great majority of his specimens at Kew, and has in several cases without criticism adopted Beddome's species. All modern pteridologists agree in taking the species in a narrower sense than Baker and Beddome, and to me several of Ridley's species are an assemblage of a number of most distinct forms. On the other hand he has adopted some of the species recently described by van Alderwerelt van Rosenburgh, who has described an immense number of new species which are scarcely all well founded, and not rarely identical with species previously described. Unfortunately a large number of his new species are not represented by authentic specimens in European herbaria, even not in Leiden. and without examination of such specimens it is in most cases rather impossible to know whether his species are valid ones or not.

As a certain number of the species adopted by Mr. Ridley were unknown to me, and others seemed to be wrongly

named, I asked Mr. Holttum to send me on loan specimens of those species from the Singapore Botanic Gardens Herbarium, and very kindly he did so.

Having thus had specimens of most species enumerated in Mr. Ridley's list, and having compared them with an immense quantity of material from Borneo and with numerous type specimens, I have been able to verify the determinations, or in several cases give the species their right names. In the present paper a part of my critical remarks are published. It contains descriptions of a couple of new species, the first record of several species for the Peninsula, and a revision of some groups of closely related species.

Copenhagen, March 4th, 1928.

Hymenophyllum productum Kunze, Bot. Zeit., 1848, 305; v. d. Bosch, Hym. Jav., 56, pl. 45.

H. demissum Ridley p. 12 (pro parte?).

PERAK: Taiping Hill (Burkill 12836). PAHANG: G. Kajang, P. Tioman (Henderson 18604).

The distinct species has by most authors been considered a "form" of the Australian *H. demissum;* it differs from that species by its smaller size, more open habit and especially by the slightly but distinctly crenately toothed tips of the indusium valves. It is apparently a common species through the Malayan region.

Hymenophyllum semifissum Copeland, Philipp. Journ. Sci., 10 C, 145. 1915.

JOHORE: Gunong Panti (Holttum 18066).

Determined rightly by Mr. Holttum. The species, previously known from Borneo only, seems to be very distinct by its subdimidiate pinnae with long linear entire secondary segments, by the few but long brown hairs on the rachis and the subtrichomanoid sori, the indusia cut half-way down only with two acute valves and a long exserted receptacle. It seems to be rather common in Sarawak, and may be confounded with two other species also common there, viz. *H. Bakeri* Copel. (*Trichomanes denticulatum* Bak.) and **H. microchilum** (Bak.) C. Chr. comb. nov. (*Trichomanes* Bak.). The former differs by the serrated segments, the latter especially by the indusia very slightly cleft with two small valves and lack of hairs. Both were referred by Baker to Trichomanes, but the whole habit agrees much better with Hymenophyllum; within this genus the three species form a special little group. The two Bornean species probably occur also in the Peninsula.

Hymenophyllum tunbridgense (L.) Sm.

To this species Ridley (p. 13) refers two specimens, not seen by me; a third from Pahang (Henderson 18275) and so named by Holttum is certainly not *H. tunbridgense*, but a form of the very variable *H. holochilum*, near var. *affine*

(v. d. B.). I do not believe that the true *H. tunbridgense* occurs in the Malayan region.

Trichomanes sublimbatum K. Muell.

Specimens from Singapore (Bukit Timah), leg. Holttum (10481) and by him named *T. sublimbatum*, agree with the specimen from the same locality (Ridley 6684) which Ridley, p. 15, referred to *T. Henzaianum* Parish. It is a proportionally large form (leaves 2-3 cm. long), deeply pinnatifid with about 4 linear oblong lobes on each side, in habit recalling the American *T. montanum* Hook. Spurious veins many, as in *T. sublimbatum* (cf. v. d. Bosch: Hym. Jav. pl.2) but connected by an intramarginal continuous spurious vein, which is not found in the genuine *T. sublimbatum*. The determination is therefore not certain, but it is not, I think, *T. Henzaianum* Parish, known by me from Hooker's illustration (Cent. pl. 1) and certainly it is not a variety of *T. Motleyi*, as suggested by Ridley. Holttum's collection (no. 10481) contains several smaller fronds which no doubt are typical *T. sublimbatum* with entire or slightly lobed blades, without intramarginal vein, and mixed with them several others of the larger, pinnatifid form. It is probable that these two forms are states of one species, and may possibly be formed on the same rhizome, which I have not, however, observed, so I am not sure. If this hypothesis is wrong, I should be inclined to consider the larger, pinnatifid form an undescribed species. I have it also from Sumatra and Borneo.

Trichomanes humile Forst., Prod., 84.

Crepidomanes humile v. d. Bosch, Hym. Jav., 16, pl. 11.

Trichomanes pyxidiferum pro parte, Ridley, p. 18.

SINGAPORE: Bukit Timah (Holttum 10482).

Easily distinguished from *T. bipunctatum* and the two following species by the presence of a *marginal* spurious vein, and by its thin texture.

Trichomanes brevipes (Pr.) Baker, Syn. Fil., 84. 1867.

Didymoglossum brevipes Presl, Hymenoph., 23,47. 1843.

Trichomanes melanorhizon Hook., Spec., 1,140. 1846. Ic. Plant., pl. 705.

Trichomanes recedens Rosenstock, Meded. Rijks Herb. Leiden, no. 11,2. 1912.

Trichomanes microlirion Copeland, Philipp. Journ. Sci,. 10 C, 146. 1915.

Trichomanes pyxidiferum pro parte, Ridley, p. 18.

SINGAPORE: (Ridley.) JOHORE: (Ridley 13473).

A beautiful series of specimens from Borneo, with which these from the Malay Peninsula fully agree, have convinced me that *T. brevipes* is a distinct species, different

from *T. bilabiatum*, to which it has been referred (see Ind. Fil.) and therefore forgotten and in recent time redescribed as a new species by Rosenstock and Copeland. It differs from *T. bilabiatum* by its light green colour, by the presence of several short reddish hairs on rachis and ribs beneath, by the short spurious veins in the parenchyma within the submarginal one being very few or none, by the sori being confined to the axils of the uppermost pinnae, which often are very much reduced so that the sori sometimes form a spike at the top of the frond, and by the valves of the indusia being short, rounded, and at maturity reflexed. *T. pyxidiferum* Ridley is partly this species, partly probably *T. bilabiatum* and *T. humile*. The genuine *T. pyxidiferum* L. is a West Indian species not found in the Old World.

Trichomanes bilabiatum Nees et Bl., Nova Acta, 11, 123, Pl. 13, fig. 2. 1823.

Didymoglossum laxum v. d. Bosch, Hym. Jav., 37, pl. 27.

I have seen no specimen of this species from the Malay Peninsula, but as it occurs in most of the Malayan Islands it certainly also may be found in the Peninsula. In habit it resembles the former species; it is dark green, not so conspicuously hairy, spurious short veins in the parenchyma numerous, and the sori not confined to the axils of the upper pinnae, several of the outer segments being often soriferous, the valves of the indusium longer.

Trichomanes setaceum v. d. Bosch, Nederl. Kruidk. Arch., 5 (2), 176. 1861.

Tr. setigerum Backh., Cat. 14. 1861 (not seen). Moore, Gard. Chron., 1862, 45, sp. auth., Kew!

Tr. parviflorum auctt.; Ridley 20, not Poir.

Most specimens from Tropical Asia hitherto named *T. parviflorum* (or *T. fœniculaceum* Bory) belong, I think, to *T. setaceum* v. d. B. described from a specimen from Singapore. It seems to be common in Borneo and may easily be known from the other species of the section Leptomanes by the ultimate filiform segments being connate below, forming an undivided basal portion of the ultimate pinnules. The true *T. parviflorum* from the Mascarene Islands has, as *T. pluma* and *T. meifolium*, the ultimate pinnules cut to the midrib into filiform, terete segments, the midribs of which are bordered by 1-3 rows of clear parenchymatous cells, much as in *T. gemmatum*. The only specimen by Ridley referred *T. parviflorum* (leg. Murton) is to me *T. setaceum*. He cites this name as a synonym of *T. cupressoides* Desv., which differs by its somewhat crisped fronds and the secondary pinnules not being dissolved into filiform segments, the ultimate veins being connate nearly to the apex.

Alsophila Burbidgei Baker, Journ. Bot., 1879, 38.

? A. trichodesma Scort., Bedd., Journ. Bot., 1887, 321.

Cyathea mollis Copel., Philipp. Journ. Sci., 12 C, 52. 1917.

PERAK: Bujang Malacca (Herb. Bot. Gard. Singapore, probably coll. Wray, s. n.; *A. trichodesma*). NEGRI SEMBILAN: Bukit Tangga (Md. Nur, 11830).

The name *A. Burbidgei* was applied by Bishop Hose and Dr. Christ to a Bornean species, which differs from the true *A. Burbidgei*, from Sarawak (Burbidge, Kew!) by the densely squamose stipe and rachis; it is, I believe, very nearly the same as *A. Margarethae* Schwet. These large tree ferns are usually very difficult to identify because most material in the herbaria is fragmentary; this is the case with the type specimens of *A. Burbidgei* and *A. Margarethae* (Herb. Bonaparte, Paris).

The genuine *A. Burbidgei*, of which the stipe is unknown to me, is a rather thin-leaved species with dark brown or atropurpureous main rachis which shows no traces of scales but is minutely scabrous from fallen hairs, above densely and adpressedly pubescent. All its ribs beneath densely hirsute by patent, rather soft, pluricellular hairs, the costules with some few lanceolate brown scales and the midribs of segments with a few whitish bullate scales beneath. The pinnules are very shortly petiolulate, the segments subentire or crenate; sporangia mixed with some long hairs.

The specimen from Negri Sembilan resembles very closely Baker's type, and the specimen from Perak, supposed to be *A. trichodesma* Scort. is very nearly the same; its rachis is lighter and still pubescent beneath, the pinnules sessile, the segments distinctly crenately toothed, the hairs stiffer, cylindrical, subulate, distinctly septate, very much like those of *A. margarethae*, but all these differences seem scarcely sufficient for the segregation of this form as a distinct species. According to Beddome its stipe is scaly at base only. *Cyathea mollis* Copel. from British North Borneo (Sandakan, Mrs. Clemens 9440, Herb. Copeland!) is, I firmly believe, a less pubescent form of the same species.

Dryopteris pectiniformis n. sp.

Lastrea. Rhizome probably erect. Stipe stramineous, shortly puberulous. Lamina ovate-elongate, acuminate, herbaceous, 45 cm. long, 22 cm. wide, bipinnatifid. Rachis densely but very shortly pubescent. Pinnae about 20 pairs, sessile, the lower opposite, the upper alternate, acuminate, the lower not reduced, the largest 11 cm. long, 1.8 cm. wide, at distances of about 3.5 cm., patent, very regularly pectinato-pinnatifid to a wing 1 mm. broad. Segments a little oblique, separated by narrow sinuses, the basal ones of lower

pinnae reduced, the upper basal one of upper pinnae somewhat enlarged, medial ones oblong, acute, entire, 2mm. broad Costae densely grayhairy on both sides, midribs and veins sparsely pubescent, the underside densely glandular with red, shining glands. Veins 7-8 jugate, simple. Sori medial or a little inframedial, indusia large, rufous, persistent, glabrous.

PERAK: without definite locality, leg. Bishop Hose. (Type in Herb. Roland Bonaparte, Mus. d'Hist. Nat. Paris).

The specimen was distributed as *Nephrodium gracilescens*, and it was probably collected in the Taiping Hills; other specimens from the same collection (Hose 293 ?) were referred to that species by Ridley, p. 64. It differs from *D. gracilescens* by larger size, finely glandular underside, more densely and more shortly pubescent rachis and costae, the large rufous-brown indusia, etc. The true *D. gracilescens* (Bl.) from Java is eglandulose, has obtuse segments, supramedial sori, and is as a whole much smaller. A specimen from Perak, leg. Scortechini, referred by Ridley to *D. gracilescens*, belongs rather to *D. pectiniformis*, agreeing with the type in the acute segments and large indusia, but it is without glands.

Dryopteris viscosa (J. Sm.) O. Kze.; C. Chr., Index.

Lastrea viscosa J. Sm., Ridley 65.

Nephrodium gymnopodum Baker, Trans. Linn. Soc., II S, Bot., 4, 252.

Dryopteris gymnopoda C. Chr., Index.

Lastrea Ridleyi Bedd., Kew Bull., 1909, 423. Ridley 65.

Dryopteris Ridleyi C. Chr., Ind. Suppl., 38, 1913.

Dryopteris athyriocarpa Copeland, Philipp. Journ. Sci., 3 C, 344. 1909.

Dryopteris kinabaluensis Copel., l. c., 12 C, 55. 1917.

Having seen the type specimens of all these "species" described as new in recent time, I am fully convinced that they all must be referred to the old *D. viscosa*. They are all fully identical as to all important characters; the dark stipe, dark colour, more or less glandular surfaces, the reflexed basal pinnae, venation, etc., varying somewhat in indusium-characters and density of the glands. These are as a rule dark-brown, like drops of gum, and may be found on both surfaces, but evidenty they soon dry out and are then scarcely perceptible. The indusia are generally persistent, reniform or sub-hippocrepiform with a deep sinus, rarely small as in a cotype specimen of *L. Ridleyi* Bedd. (Ridley 7849), which was described as exindusiate; it is identical with *N. gymnopodum* Bak. from Mt. Kinabalu, British N. Borneo (Haviland 1486, Kew!). *D. kinabaluensis* Copel. from the same mountain (Topping 1719, Herb.

Copeland!) is quite the same. *D. athyriocarpa* Copel. from Sarawak, Bongo Range (Brooks and Hewitt, Herb. Copeland!) is a somewhat different form, evidently common in Borneo, with subathyrioid indusia and the upper basal segment lobed. Other forms occur in Sumatra; the whole complex of forms is closely allied to *D. gracilescens*. Intimately allied to *D. viscosa* is

Dryopteris Robinsonii (Ridley) C. Chr. comb. nov.
Lastrea Robinsoni Ridley, 65.

In general habit and colour it does not differ from *L. viscosa*, but its pubescence is peculiar and it seems to be distinct. The whole leaf is densely glanduloso-pubescent with short hairs, those of the rachis and costae longer and reddish. The surfaces are densely dotted with small whitish spots, probably glands, that are dried out.

Dryopteris crassifolia (Bl.) O. Kze, and related species.

D. crassifolia is, as interpreted in Syn. Fil., by Beddome and Ridley a composite species, including several distinct forms, which I consider good species. In the large collections of Bornean ferns examined by me I find six or seven species pertaining to this group, which presumably also occur in the Malay Peninsula. This narrow group represents the American subgenus *Steiropteris* in Malaya, but is probably not genetically related to it. All species are very uniform in several characters, by which they differ essentially from all other species of the genus. The fronds are more or less coriaceous, when dried of a characteristic brown colour, the lower pinnae distinctly stalked, the veins simple and the basal ones connivent to the sinus, not truly united; in most species an intermittent vein runs from the costa between two segments to the sinus. It is a true vein, not a carinate fold as found in *Steiropteris*. Indusia generally large, but easily rubbed off. Rhizome (of all species?) creeping, the lamina not narrowed below, often terminating in a subdistinct pinnatifid end-pinna, yet not imparipinnate. To this group must naturally be joined some few species that differ from *D. crassifolia* and its immediate allies by the densely scaly stipe and lower part of rachis. All these species at present known to me may be distinguished by the following key:

1. Stipe naked or scaly near base only; rachis without scales or practically so - - - - 2
   Stipe and lower part of rachis densely scaly with linear castaneous scales, or woolly - - - 6
2. Leaf papyraceous or chartaceous. Pinnae about 2 cm. or less wide, deeply incised to a wing to the costa 1—2 mm. wide, the segments under 3 mm. in width; the

posterior basal vein springs out from the midrib or from the costa close to the axil of the midrib, reaching the edge just above the bottom of the sinus, to which the opposite anterior vein runs - 3

Leaf rigidly coriaceous. Pinnae 2—4 cm. wide, incised 1/2 to 2/3 of the way to the midrib, the segments 5—10 mm. broad; the posterior basal vein springs out from the costa 1—5 mm. from the base of the midrib, often midway between two midribs, and running straight to the sinus, below which it is connivent with the opposite anterior vein - - - 5

3. Leaves small, rarely 25 cm. long including the stipe, 4 cm. wide. often much smaller - - - *D. Teuscheri* v. A. v. R.

Leaves much larger, 50—100 cm. long, 25 cm. wide - - - 4

4. Leaf brown when dried; lower pinnae short-stalked (stalks 1—2 mm.); rachis and costae beneath shortly pubescent and furnished with scattered linear brown scales; edges of segments distinctly thickened - - - *D. chlamydophora* Ros.

Leaf grey-green when dried; lower pinnae on stalks 1—1.5 cm. long; leaf practically glabrous throughout, at best thickly puberulous on rachis above and on costae; scales few or none - *D. Beccariana* (Ces.) C. Chr.

5. Sori subcostular or at least distinctly inframedial; costae without scales beneath (?); pinnae incised 3/4 of the way down, the costal wing at best 5 mm. broad; segments 5—7 mm. broad, falcate *D. crassifolia* (Bl.) O. Kze.

Sori medial, sometimes supramedial; costae slightly scaly beneath; pinnae incised about 1/2 way, the costal wing 8—10 mm. broad; segments 8—10 mm. broad *D. Motleyana* (Hook.) C. Chr.

6. Pinnae scarcely 2 cm. broad; basal veins both running from the base of the midribs to the sinus; costae

and veins beneath short-hairy; indusia persistent - - - *D. echinata* (Mett.) O. Kze.
Pinnae 2—4 cm. broad; posterior basal vein springing out from the costa and meeting the opposite anterior one below the sinus - 7
7. Costae above broadly sulcate with the edges of the furrow densely bearded with brownish patent hairs; leaf coriaceous, brownish when dried - - - - 8
Costae above narrowly sulcate antrorsely strigose with shorter or longer hairs; leaf subcoriaceous or rather thin, grey-green - *D. trichopoda* C. Chr.
8. Costae and veins beneath sparsely pubescent; indusia small or none (?); rachis scaly in the lower part only - - - - *D. Hallieri* (Christ) C. Chr.
Costae and veins densely villous; indusia persistent, hirsute; rachis scaly throughout - - - *D. paleata* Copel.

Dryopteris Teuscheri v. A. v. R., Bull. Dept. Agric. Ind. Néerl., 18, 6. 1908. Mal. Ferns, 183.

To this species, known to me from description only, I refer some specimens from Borneo and Sumatra which differ from the other species of the group by their small size. The largest leaf seen is 25 cm. long by 7 cm. wide, the stipe excluded, others much smaller, 10 cm. long by 2 cm. wide, chartaceous, brownish when dried, glossy above, finely downy and glandular beneath; rachis brownish, quadrangular, rather densely and long-hairy above, glabrous beneath; pinnae alternate, distinctly petiolate, (petioles 0.5—1 mm. long) the basal ones somewhat reduced and often reflexed, the medial ones the largest, 4 cm. long, 1 cm. wide, of small leaves 1—2 cm. long, 3—6 mm. wide, below the short entire obtuse or acute apex, cut down to a wing 1 mm. broad; upper pinnae sessile subentire. Segments oblique, oblong, obtuse, parallel, entire, 1—1.5 mm. broad, the basal ones of lower pinnae much reduced, the upper one free, 1 mm. long and broad, the lower one often quite obsolete. Veins free, simple, about 6-jugate, the anterior basal one running to the sinus, the posterior reaching the edge just above the bottom of the sinus. Sori medial. slightly impressed; indusia persistent, reniform, brown, glabrous (hairy, t. v. A. v. R.). Sarawak: Mt Matang (J. Hewitt 1908, Herb. Copeland); Bongo Range (C. J. Brooks 13, Herb. Copeland, Herb. C. Chr.). Sumatra: (J. Winkler 51).

In size and general habit this new species resembles small forms of *D. gracilescens*, but several important characters, as colour, texture, venation, indusia, show that its

nearest relative is *D. Beccariana*, and I referred my first specimens to that species, but the better specimens in herb. Copeland have, I believe, justified its segregation as a distinct species, especially differing from *D. Beccariana* by its much smaller size, short-tipped pinnae, and the rachis being rather longhairy above. I have seen no specimens of this species from the Malay Peninsula, where it very likely occurs. The specimens referred here are not quite identical; that from Sumatra is glandular and hairy beneath, as described by v. A. v. R.; those from Borneo without glands and glabrous beneath. The type was collected in Borneo.

Dryopteris Beccariana (Cesati) C. Chr., Index 254.

Nephrodium Beccarianum Cesati, Atti Acad. Napoli, 7, part 8, 23, 1876.

Beautiful specimens of this hitherto badly known species were collected by Dr. E. Mjoberg on Mt. Matang, Sarawak, which are fully identical with a fragment of the type, leg. Beccari (Kew!). In most characters it agrees with *D. Teuscheri*, but it is much larger. Stipe up to 50 cm. long, at base with many lanceolate castaneous scales, lamina 40-50 cm. long, 15-25 cm. broad, grey-green, papyraceous, practically glabrous and naked throughout (some minute hairs may be found on the upper part of the stramineous rachis and on the costae beneath). Most pinnae long-stalked (stalks 1-1.5 cm. long) terminating in long subentire caudate apex, incised to a wing 1.5-2 mm. broad, segments parallel, entire, oblique or subfalcate, subacute, about 3 mm. broad (those of the sterile leaf a little wider), the basal ones of lower pinnae much reduced or both fully obsolete, then the pinnae shortly cuneate at base. Veins about 12-jugate, simple, the basal ones running like those of *D. brunnescens*. Sori inframedial, indusia large, coriaceous, rufous or deep brown, glabrous, easily rubbed off.

SARAWAK: Mt. Matang (Beccari, Kew! E. Mjoberg, Herb. C. Chr.)

NEGRI SEMBILAN: Gunong Angsi, 1200 ft. (E. S. & G. Hose 4813, received from Kew). The latter specimen differs a little from the type by the sori being close to the midrib.

Dryopteris chlamydophora Rosenstock, Meded. Rijks Herb. Leiden, no. 31,5. 1917.

Lastrea nephrodioides Bedd., F. B. I., pl. 199 (not Moore).

Closely resembling *D. Beccariana* in size, texture, cutting and venation, but brown when dried. It differs by the rachis and costae and veins beneath being shortly pubescent and furnished with several linear brown scales, the underside being somewhat glandular, and by the much shorter 2-4 mm. long petioles of the lower pinnae; largest pinnae 20 cm. long, 2 cm. wide, the margins distinctly thickened,

the upper ones truncate-subcordate at base; veins 10-12 jugate; sori inframedial with large red indusia; sporangia mixed with shining red glands.

BORNEO: (Korthals, type in Leiden!); Sarawak, top of Mt. Poi (E. Mjoberg. Herb. C. Chr.).

MALAY PENINSULA: JOHORE, G. Panti (Holttum 18089); without definite locality, Kew distr. 738 (Herb. Copenhagen).

Most specimens quoted have been named *D. crassifolia*; they differ essentially from that species by much thinner texture, venation and glands. *Lastrea nephrodioides* Bedd., from Burma, referred by the author himself to *L. crassifolia* (Handb. 238) is according to description and illustration a more hairy form of *D. chlamydophora*; the name *nephrodioides* is not available in the genus.

Dryopteris crassifolia (Bl.) O. Kze.; C. Chr., Ind. 258.

Lastrea lata J. Sm., Hook. Journ. Bot., 3, 412.

The true *D. crassifolia* is, according to a cotype specimen from Java, leg. Blume, a much more rigid plant than the three former species, and with different venation owing to the pinnae being less deeply lobed as noted in the key above; the edge of the falcate segments is distinctly thickened; veins about 10-jugate; costae shortly strigose above, rather densely whitish-pubescent beneath with short crisped hairs and furnished with some brown scales towards the base, surfaces otherwise glabrous. Sori near the midrib, indusia apparently smaller and less coriaceous than in the former species.

This species is probably distributed through the whole Malayan region, but its area cannot now be determined with certainty, because most specimens so named appear to belong to other species. *Lastrea lata* J. Sm. from Luzon (Cuming 266) agrees closely with Blume's type, and a specimen from Perak (G. Hijau, Burkill 12588) is as to most characters typical, differing somewhat by the 1-2 cm. long stalks of the pinnae; according to Mr. Holttum it falls under *Nephrodium brachyodon* Bedd., Handb. 281, which to me is nearly identical with *D. Motleyana*.

Dryopteris Motleyana (Hook.) C. Chr., Ind. 278.

Nephrodium Motleyanum Hook., Syn. Fil., 266 (sub N. crassifolia).

Nephrodium brachyodon Bedd., Ferns Brit. Ind., Suppl., pl. 379; Handb. 281; Ridley 74; not Hooker.

In colour, texture and pubescence very similar to *D. crassifolia*, from which it differs mainly by its less deeply cut pinnae and medial sori. Stipe about 50 cm. long, scaly at base, like the rachis greyish-brown and finely puberulous. Lamina ovate-lanceolate or ovate-deltoid, 40-50 cm. long, 15-20 cm. wide, the sterile ones somewhat larger, pinnate,

rather abruptly narrowed into a pinnatifid apex. Lateral pinnae in 10-15 pairs, short-stalked (petioles of the lower ones rarely 1 cm. long), 10-12 cm. long, 2-2.5 cm. broad, truncate at base, terminating in a 2-3 cm. long entire acuminate apex, incised 1/3-1/2 of the way to the midrib into falcate segments 5 mm. long and broad. Veins of fertile segments 8-9-jugate, the posterior basal one generally springing out from the costa just below the sinus, below which it meets the opposite anterior one; the following two veins run out to the edge close to the bottom of the sinus. Sori medial or a little supramedial, indusia small fugacious; receptacle with several globose glands. Costa whitish-puberulous beneath, and towards the base furnished with several linear, brown scales.

BORNEO: LABUAN (Motley, type, Kew!); SARAWAK, Mt. Merinjak (Native collector, Sarawak Museum 161); DUTCH BORNEO, G. Damoet (Hallier 557).

PERAK: Gunong Keledang (Ridley 9537).

D. Motleyana, as here understood, includes the Asiatic form, which English botanists wrongly have referred to the American *D. brachyodus* (Kze) O. Kze. This is quite another species with 3-4 pairs of veins joining a membrane below the sinus and with a distinct aerophore at the base of the pinnae; in my monograph of the genus Dryopteris, 1, p. 172, I have referred it to *D. glandulosa* (Desv.) C. Chr. (not the Asiatic *D. glandulosa*) as a variety. Beddome's figure of his *N. brachyodon* is as a whole good, but the venation is not shown quite correctly.

To *D. Motleyana* I provisionally refer the following form as a variety:

var. **dulitenses** n. var.

Pinnae in four subopposite pairs below a terminal one nearly conform with the lateral ones, the largest 15 cm. long, 4 cm. wide, the basal ones on stalks 1.5 cm. long, incised about ½, the segments nearly 1 cm. broad, otherwise scarcely different from the type.

SARAWAK: Mt. Dulit (E. Mjoberg, Herb. C. Chr.).

The following species form a special group, well characterised by the strong stipe being densely covered with castaneous scales throughout, a character very rarely found within the genus Dryopteris. As to other characters, the species show a close affinity to the narrow group of *D. crassifolia*. Most species are known from a single collection. and it is probable that their number should be considerably reduced. They differ chiefly by the density of the pubescence, a character not always a good one, and it is not improbable that they will appear to be forms of a single species.

Dryopteris echinata (Mett.) O. Kze. C. Chr., Ind. 262.

Lamina firmly herbaceous, 70-80 cm. long, rather gradually attenuated into a pinnatifid apex. Pinnae 15 cm. long, 1.5-2 cm. broad, the basal ones somewhat reduced and reflexed, incised to a wing about 2 mm. broad, the segments subfalcate, obtuse, parallel, 3 mm. broad; veins 9-10 jugate, the basal ones both running from the base of the midribs to the bottom of the sinus. Costae above deeply sulcate with the raised edges of the furrow rather densely antrorsely strigose, the upper side otherwise glabrous, the margins ciliate; costae and midribs beneath densely and shortly pubescent with whitish, patent hairs, the veins and leaf-tissue thinly downy or almost glabrous. Sori inframedial, indusia persistent, brown, white-setose.

BORNEO: (Korthals!), and several other specimens.

Dryopteris Hallieri (Christ) C. Chr., Ind. 269.

Intermediate between *D. echinata* and *D. trichopoda*, resembling the former in pubescence, the latter in texture. The sessile pinnae are 15-20 cm. long, 3 cm. broad, incised to a wing 4 mm. broad, coriaceous, brown, their costae broadly sulcate above, densely bearded by patent brownish hairs; costae and veins beneath pubescent with whitish needle-like shorter and longer hairs. Veins raised below, 10-11 jugate, the posterior basal one springing out from the costa about 1 mm. from the midrib and meeting the opposite anterior one a little below the sinus. Sori inframedial; indusia all rubber off.

DUTCH BORNEO: Amai Ambit (Hallier 3204!).

Dryopteris paleata Copeland, Philip. Journ. Sci., 9 C, 228. 1914. This comes very near to *D. Hallieri*, but is much more hairy and the indusia are rather persistent and hirsute. Costae above bearded as in *D. Hallieri*, beneath like the veins densely but shortly and softly villous, the margins long-ciliate. Further it differs in the rachis being densely scaly throughout, the scales about 1-2 cm. long, castaneous, lanceolate-acuminate, slightly fimbriated; and in all pinnae being short-stalked, at least distinctly so in the specimen from the Peninsula, which otherwise agrees closely with a cotype specimen in Herb. Bonaparte. Pinnae 15-20 cm. long, 2-2.5 cm. wide. Sporangia with numerous globse glands intermixed.

SUMATRA: Lebang Tandai, Benkoelen (C. J. Brooks 68. Herb. Bonaparte).

NEGRI SEMBILAN: G. Angsi (Holttum 9926).

Dryopteris trichopoda C. Chr., Ind. 298.

Nephrodium polytrichum Baker, Jour. Bot., 1891, 107.

Leaf 1 meter or more long, subcoriaceous. Pinnae up to 30 cm. long, 4.5 cm. broad, long-acuminate, sessile, incised to a wing 5 mm. broad, the segments falcate, 5 mm. broad the upper basal one somewhat reduced; costae and veins

densely hirsute beneath with long patent hairs. costae above shortly strigose, not bearded as in *D. Hallieri.* Veins 14-15 jugate, not raised below, the basal ones connivent below the sinus. Sori inframedial; indusia small, hirsute.

SARAWAK: Lingga Mts., (Bishop Hose, Kew!; Hewitt).

The rachis is not destitute of paleae as described by Baker; the scales become fewer upwards and extend to the lower part of the costae beneath as in the other species of the group.

To *D. trichopoda* I refer with some doubt a couple of specimens, that differ from the type in thinner texture, more soft pubescence and narrower pinnae; the under side is slightly glandular with red glands, the receptacle with many globose glands.

PENANG: C. G. Matthew 934 (Herb. C. Chr.).

SUMATRA: J. Winkler.

This form is evidently *N. crinipes* of Ridley (p. 71), not of Hooker.

The North-Indian *D. crinipes* is quite another species, with the basal veins truly united and with several pairs of reduced pinnae below.

Dryopteris persquamifera v. A. v. R.. (Bull. Jard. Bot. Buitenzorg, Ser. II, no. XVI, 10. 1914) from Celebes, known to me from description only, is evidently a species of this group.

The following species resembles in several characters those just mentioned, but its pubescence is peculiar and the venation is different, so that I dare not now associate it with them.

Dryopteris monodonta C. Chr., Ind. 278.

Lastrea unidentata Bedd., Handb. Suppl., 53; Ridley 64. (not *Dryopteris unidentata* (Hook. et Arn.) C. Chr.).

A specimen from the type locality, Gunong Bubu, Perak (Wray 3873) belongs no doubt to this species, although it does not agree in all details with Beddome's description. It is easily distinguished from the former species by stipe and rachis being densely and softly velutinous with thin jointed hairs, which are mixed with several lanceolate castaneous or blackish scales like those of *D. paleata*; in young leaves these scales are probably much more numerous. Pinnae strictly sessile, the basal segments somewhat produced and sublobate at base (rarely unidentate as described by Beddome, the name thus an unsuitable one) costae densely tomentose (not bearded) above, more thinly hirsute beneath with hairs like those of the rachis, and beneath dotted with conspicuous yellowish, dull glands. The basal veins spring both out from the midrib above its base and reach the margin above the bottom of the sinus as in the subgenus *Lastrea.* Sori

inframedial or subcostular, the indusia brown, thin, erose, glabrous, subpersistent.

Dryopteris heterocarpa (Bl.) O. Kze.

To this extremely variable species I refer as a glabrous form *Nephrodium glaucostipes* Bedd. (Ridley 75) judging from a cotype specimen in the Singapore Herbarium (Kunstler 2046). The under side is densely dotted with yellow glands as in the type, a character not mentioned in Beddome's description. Only one pair of veins truly join, and the following two run to the sinus. Similar forms occur in Borneo.

Dryopteris angustipes Copeland, Philipp. Journ. Sci., 7 C, 60. 1912.

NEGRI SEMBILAN: Setul Pass (E. S. & G. Hose 5050, received from Kew as *Nephrodium molle*).

A weakly characterised species, nearer *D. heterocarpa* than the *parasitica* complex, marked by a long row of reduced auriculiform pinnae along the stipe nearly to its base, the densely glandular under side, which is glabrous beyond the antrorsely strigose costae and contulae, the upper side strigose with appressed hairs and with scattered patent hairs on the veins; only one pair of veins anastomose. The specimen quoted agrees well with the type from Sarawak (Brooks 110, Herb. Copeland!). I am inclined to consider it a form of *D. heterocarpa*.

Dryopteris parasitica (L.) O. Kze. C. Chr., Ind., pro parte.

Nephrodium didymosorum Bedd., Ferns Brit. Ind., pl. 200.

Nephrodium tectum Bedd., Handb. Suppl., 79.

N. molle var. *didymosorum* Ridley 73.

Lastrea cana Bedd., Kew Bull., 1909, 424; Ridley 64. (not J. Sm.)

Among the numuerous forms spread through all the tropics referred by authors to *D. parasitica* (*Nephrodium molle* auctt.) that described as *N. didymosorum* Bedd. best agrees with the genuine *Polypodium parasiticum* L., which is rather common in South-eastern China. It is densely hairy throughout, the lower pinnae not abbreviated and only one pair of anastomosing veins; sori often in a single pair at the base of each segment, but this character is not constant, 3-6 pairs of sori often being present. The specimen from Selangor (Ridley 7859) referred by Beddome and Ridley to *L. cana* belongs here; the genuine *D. cana* is a Lastrea with free veins.

Quite different from the true *D. parasitica* is a group of forms, which occur everywhere in tropical Asia and are commonly referred to *Nephrodium molle*, the type of which

is American, and to *N. amboinense*; I now refer them all to a single species, which I call

Dryopteris subpubescens (Bl.) C. Chr. comb. nov.

Aspidium subpubescens Bl., Enum., 149. 1828.

Nephrodium amboinense auctt.; Bedd., Handb. Suppl., 75.

N. molle var. *amboinense* Ridley 73.

This species differs materially from *D. parasitica* by the lower 2-3 pairs of pinnae being considerably abbreviated, by the less pubescent, often subglabrous surfaces, and by 3 or 4 lower veins (2 pairs) being united. The typical form is smaller than *D. parasitica*, the pinnae rarely 10 cm. long, 1.5 cm. broad. Hitherto this species has been named by most authors *N. amboinense* or *N. molle* var. *amboinense*, but it agrees badly with the type specimen of *Aspidium amboinense* Willd. (Bot. Mus. Berlin!) which is much smaller and less incised. Till now I have seen no specimen that exactly matches Willdenow's type from Amboyna, while on the other hand numerous specimens examined closely agree with the type of *A. subpubescens* Bl. from Java, leg. Blume! Typical *subpubescens* is a common fern in Malaya and several specimens from the Peninsula have been seen.

To this species I provisionally refer as a variety: var. **major** (Bedd.).

Nephrodium molle var. *major* Bedd., Handb. Suppl., 76.

Dryopteris sumatrana v. A. v. R., Mal. Ferns, 227.

Larger than the type; pinnae up to 15 cm. long, 2 cm. broad, bright green and of firmer texture, both surfaces finely downy with longer hairs on the costae and veins.

Common in Borneo, Sumatra and in the Peninsula (Singapore, Ridley 9481 and other specimens seen). It is perhaps a distinct species, but specimens from Borneo are intermediate between it and typical *D. subpubescens*.

To this variety I refer a specimen from Singapore (Rifle Range) quoted by Ridley under his *N. multilineatum* (p. 72). It differs from the common form by the lack of abbreviated pinnae, but as to all other characters it is typical. *N. multilineatum* Bedd. and Ridley should be called *Dryopteris megaphylla* (Mett.) C. Chr. It is widely different from all forms of the *parasitica* complex by its much larger fronds with pinnae up to 30 cm. long, nearly glabrous, shallowly cut only and with several pairs of alternately anastomosing veins. Several specimens distributed from Kew under the name *N. brachyodon* belong here.

A third, but somewhat doubtful species, is **Dryopteris procurrens** (Mett.) O. Kze.; C. Chr., Ind.

Nephrodium molle var. *procurrens* Ridley 73.

It differs mainly from *D. subpubescens* by its long creeping rhizome, but is otherwise so like it that specimens

without rhizome can scarcely be determined with certainty. Studies in the field may decide, perhaps, whether it is a good species, or, as Beddome believed, a form of *D. subpubescens*. The north Indian form referred by some authors to *D. procurrens* seems to be another thing. It is the var. *aureum* Clarke (Bedd. Handb. 278) and has been later redescribed as *Dryopteris cylindrothrix* Rosenstock, Fedde Repert., 12, 246. 1913.

Dryopteris Toppingii Copeland, Philipp. Journ. Sci., 12 C, 56. 1917. A co-type specimen of *Nephrodium pennigerum* var. *malayense* Bedd. (Handb. Suppl. 74: *Dryopteris indica* var. *malayense* v. A. v. R., Mal. Ferns 224: *Nephrodium indicum* Ridley 73) agrees very closely with the type of *D. Toppingii* from Mt. Kinabalu, B.N.Borneo (Topping 1766, Herb. Copeland!), differing by both surfaces being slightly downy and the indusia being pubescent; notwithstanding this difference I prefer to call the specimen *D. Toppingii*. The sori are not medial on the veins as described by Ridley but submarginal just as in the type.

Dryopteris mirabilis Copeland, Philipp. Journ. Sci., 6 C, 137, pl. 19. 1911.

Phegopteris cordifolia v. A. v. R. Bull. Jard. Buitenzorg, II S, XI, 19, pl. 5. 1913.

Dryopteris cordifolia v. A. v. R., l. c., C. Chr., Ind. Suppl. prél., 14.

Polypodium holophyllum Baker, Journ. Bot., 1888, 325 (not 1879, 43).

Dryopteris holophylla C. Chr., Ind., 271. 1905.

KEDAH: Pulau Langkawi (Holttum 17436).

As here interpreted this species includes a number of forms, which most authors have referred to *D. glandulosa* (Bl.) O. Kze. They differ from that species by the lateral pinnae being very few (1-2 pairs) or none, and much smaller than the large terminal one, and by the lack of glands; both surfaces densely verrucose. The frond is sometimes simple, cordate at base, and the edges subentire; this is *D. holophylla* from Sarawak (Hose, Kew!). *D. cordifolia* v. A. v. R. from Dutch Borneo (cotype in Rijks Herb. Leiden!) is the same with 2-3 lateral pinnae, and *D. mirabilis* Copeland from Sarawak (Brooks, Herb. Copeland!) is very nearly the same with a single pair of pinnae and with the indusiate sori arranged in distinct rows parallel to the midrib; the end pinna is more or less deeply crenate-dentate. The specimen from Kedah agrees best with *D. mirabilis* Copel., type, but 3-5 lateral pinnae are present. Like most forms of the species its leaves are subdimorphous, the fertile ones being narrower on longer stalks.

Dryopteris vilis (Kze) O. Kze.; C. Chr., Index, 300.

Aspidium intermedium Bl., Enum., 161; not others.

Dryopteris intermedia O. Kze.; v. A. v. R., Bull.

Jard. Buitenzorg, III S, 2, 144. 1920.

?*Lastrea intermedia* Ridley 68.

Dryopteris rhodolepis C. Chr., Ind. 288, pro parte.

Nephrodium sarawakense Bak., Journ. Linn. Soc. Bot., 22, 225. 1886.

Dryopteris sarawakensis v. A. v. R., Mal. Ferns, 200.

Lastrea padangensis Bedd., Handb. Suppl., 60. 1892. Ridley 68.

Dryopteris padangensis C. Chr., Ind. 282.

According to Prof. Rosenstock, who has examined the type specimens of both species in Leiden, *Aspidium vile* Kze is identical with *A. intermedium* Bl., and *N. sarawakense* Bak. (type, Kew!) is exactly the same. Unaware of this, in my Index I preferred for the whole complex of forms referred in Hook. Bak. Syn. Fil. to *N. intermedium* Clarke's name *rhodolepis*, used originally for a north Indian form, which I now consider distinct from *A. intermedium* Bl. Both this name and *Lastrea Blumei* Moore are invalidated within the genus, and the species must, therefore, now be called *D. vilis*. It seems to be very variable, and found in most regions of tropical Asia and Polynesia, in some places running gradually into related species, e.g. *D. aciculata* (Bak.) C. Chr. I hope to be enabled to unravel these forms later on; here it must suffice to state that all specimens seen from the Malay Peninsula belong with approximate certainty to *D. vilis*; very likely the large *D. aciculata* also occurs there, as it is common in Borneo. I have received from Mr. Holttum a specimen from Pahang, gorge of the Tras (Burkill 16939) named *D. padangensis* (Bedd.) C. Chr. It agrees excellently with Beddome's description, and I think it was rightly named; it appears to be fully identical with *D. vilis* (*N. sarawakensis* Bak.), and I dare, therefore, reduce Beddome's species to a synonym. Another specimen from Pahang, (Buloh Telang, P. Tioman, Henderson 18593) is unfortunately sterile; it is intermediate between *D. vilis* and *D. aciculata* and belongs perhaps to the latter species.

Dryopteris Boryana (Willd.) O. Kze.; C. Chr., Ind.

Phegopteris Kingi Bedd., Handb. Suppl., 84; Ridley 54.

Dryopteris Kingi C. Chr., Ind. 273.

Although Beddome (Handb. 266) quoted "Malay Peninsula" as a locality for his *Lastrea Boryana*, the species is not mentioned by Ridley. Having seen a couple of pinnae of the type collection of *Phegopteris Kingi* Bedd. from Perak (Kunstler 2250) I have little doubt that the "species" is a form of *D. Boryana*. It differs a little from the form occurring in Java by the pale green colour and apparently

exindusiate sori; in size, texture cutting and pubescence it is identical. *Polypodium subtripinnatum* Clarke, referred here by Beddome, is another exindusiate form. Whether the Indian-Malayan *D. Boryana* is the same as the genuine *D. Boryana* (Willd.) from Réunion is another question; if not, the old name *Aspidium divisum* Wall. (Nephrodium Hook.) must be taken up for the Asiatic forms.

Polystichum lindsaeifolium Scort., Ridley 61 (wrongly spelled *lindseaefolium*).

The specimen from Kelantan (Nur 12118) referred here by Ridley is so different from the North-Indian *P. obliquum* (Don) Moore that I consider Ridley's new species a good one. The leaves are much longer, up to 30 cm. long by 3.5 cm. wide, with 30-35 pairs of pinnae; these are subdimidiate, auricled at the upper base and shallowly crenately toothed at the upper and outer edge, the short teeth obtuse, never aristate, the stipe 4-5 cm. long with only some light brown scales, the rachis very scantily fibrillose or almost naked as are the surfaces; at best some few minute scales may be found beneath. Sori submarginal at the base of the teeth; indusia pale, orbicular, easily rubbed off.

Aspidium subdecurrens (Luerss.) C. Chr., Ind. 94.

Phegopteris subdecurrens Luerss., Bot. Centralbl., 11, 30. 1882.

SINGAPORE: Pulau Ubin (F. Kehding 2960!, Ridley 6027).

This characteristic species was omitted by Ridley although collected by himself at the type-locality. It is allied to *A. polymorphum* Wall., distinguished from that species by the terminal pinna being decurrent. The quite glabrous fronds are somewhat dimorphous, the sterile ones being larger than the fertile; terminal pinna of sterile frond up to 35 cm. long and 15 cm. wide, ovate, acuminate, entire or repand, at base confluent with one or two pairs of ascending large lobes, the lowest of which are decurrent along the rachis, the wing thus formed not reaching the upper pair of free pinnae, which are adnate to the rachis;[1] below them another pair of free, short-stalked entire pinnae, these broadest at the middle (6 cm.) and narrowed to both ends; fertile fronds similar but smaller; main veins distinct to the edge, connected by numerous arching cross-veins, smaller veins forming numerous angular areoles, mostly without free included veinlets. Sori exindusiate, small, irregularly scattered, dorsal on the netted veins, often elongated and confluent.

Aspidium terminale Rosenstock, Meded. 's Rijks Herb. Leiden, 31, 4. 1917.

[1] The extent of the wing on the rachis is very variable in this species. It is sometimes continuous throughout the rachis, extending even below the lowest pinnae. (R.E.H.)

LOWER SIAM: Khaw Pok Hill (Haniff & Nur 3828).

This most distinct species was founded by Prof. Rosenstock on a specimen from Dutch Borneo (Gunong Kempai, Hallier 1821, Rijks Herb. Leiden!) and very briefly described. In all essential characters the specimen from Siam kindly sent me by Mr. Holttum fully agrees, but receding from it in some minor points. The type may shortly be described thus:

In habit not essentially different from *A. polymorphum* Wall. The leaf is pinnate with three pairs of opposite short-stalked pinnae, which are all entire, cordate at base, oblong, acute or short-acuminate, the lowest 25 cm. long by 7 cm. wide and with a triangular hastate terminal pinna, cordate at base and with a pair of spreading basal lobes, the central lobe triangular, slightly lobed. Texture thin, the larger ribs very shortly rusty-tomentose above, the surfaces otherwise glabrous. A scaly bud is borne on the upper side of the rachis at the base of the terminal pinna, and smaller buds are found on the costa, mostly at the axil of a main vein, sometimes also on the basal cross-veins. All veins distinct, the finer ones forming a dense net of small areoles between the cross-veins, the areoles with free included veinlets. Sori irregularly scattered over the whole underside, very small, nearly always apical on the free veinlets. Indusia subpersistent, reniform, glabrous. The specimen from Siam agrees with the type in colour, texture, venation and sori; there is no bud on the rachis, but small buds are found here and there in the axils of the main veins. It differs chiefly in the shape of the pinnae, which are ovate or elliptical, rounded-cuneate at base, the basal ones unequally short-lobed, 18 cm. long by 10 cm. wide at the middle.

A. terminale differs chiefly from *A. polymorphum* by the gemmiferous rachis and costa and by the apical sori.

Leptochilus malaccensis sp. nov.

Rhizome creeping, clothed with dark brown lanceolate entire scales. Leaves subapproximate, dimorphic. Stipe of sterile ones about 20 cm. long, slightly scaly. Lamina about 25 cm. long and wide, with 5-7 pairs of distant lateral pinnae and a conform terminal one, dark green, subcoriaceous, glabrous but obscurely paleaceous on the costa beneath and on rachis, the scales small, blackish-brown. Pinnae lanceolate, up to 15 cm. long, 1-1.2 cm. wide at the middle, the lower ones short-stalked, the upper adnate to rachis and a little decurrent, all long-cuneate at base and long-acuminate at apex, entire. Main veins tolerably visible to near the edges, other veins quite hidden. The veins anastomose about as in *L. heteroclitus* (Bl.), i.e. forming a costal areole and above this two large costular ones on each side of the main vein; between these are found three central ones, a middle larger

one and an upper and lower smaller one, all areoles without free included veinlets. Fertile frond similar with contracted pinnae, which are about 10 cm. long, 7-8 mm. wide.

PAHANG: Buloh Telang, Pulau Tioman, (M. R. Henderson, Herb. Singapore, 18589, type in Herb. C. Chr.). KEDAH: P. Langkawi. G. Raya, (Curtis 3371, L. Preslianus Ridley 115).

This apparently most distinct species was wrongly referred to *L. Preslianus* C. Chr. by Ridley, l. c. Certainly it resembles that species superficially, but the venation is totally different, resembling that of *L. heteroclitus* (Bl.) C. Chr. (cf. Blume, Fl. Javae, pl. 13) but owing to the narrowness of the pinnae, the number of intercostular areoles is, of course, much smaller.

Stenochlaena leptocarpa (Fée) Underwood, Bull. Torrey Bot. Club, 33, 47. 1906.

Lomariopsis leptocarpa Fée, Acrost., 69, pl. 29. 1845.

Stenochlaena sorbifolia, pro parte, Ridley 111.

PERAK: Birch's Hill, (I. H. Burkill, Herb. Singapore 12725).

The specimen agrees closely with Fée's figure of the type from Luzon (Cuming 132). Among the Malayan species of the genus this resembles most the West Indian *S. sorbifolia*, but is yet quite different. The numerous sterile pinnae are about 12 cm. long and scarcely 1.5 cm. wide, gradually long-acuminate, their base subequally rounded-cuneate. The species is probably widely dispersed through the Malayan region.

Stenochlaena cochinchinensis (Fée) Underwood, Bull. Torrey Bot. Club, 33, 46. 1906.

Lomariopsis cochinchinensis Fée, Acrost., 66, pl. 26. 1845.

Stenochlaena abrupta v. A. v. R., Bull. Jard. Buitenzorg, II S, XX, 24. 1915. Handb. Suppl., 429.

Stenochlaena sorbifolia, pro parte, Ridley 111.

SINGAPORE: Botanic Garden, in the Dell (Herb. Singapore, 17484).

PAHANG: Sedagong, Pulau Tioman (Henderson 18618).

One of the best characterized species of the *S. sorbifolia* complex. Sterile leaves sometimes simple, but developed ones pinnate with up to 12 pairs of pinnae, these 12-15 cm. long by 4-5 cm wide, the base cuneate below, rounded above, the apex suddenly narrowed into a short "traufelspitze." *S. abrupta* v. A. v. R. is the same (an authentic specimen in herb. Leiden). The species is known from Cochinchina, Borneo, the Malay Peninsula, and Sumatra.

LINDSAYA

The smaller, simply pinnate forms of this genus were referred by older authors to several distinct species, the number of which later was greatly reduced, and Baker and Beddome referred most of them to a single species, *L. cultrata*. It seems to me however that some of the older species may be maintained as valid ones, and I shall here try to characterize briefly those species recorded from the Malay Peninsula.

A. Rhizome short-creeping, often very short, the leaves tufted, or nearly so.

1. **L. cultrata** (Willd.) Sw. . .

Stipe and rachis round beneath, sulcate above; pinnae about 1. cm. long, subacute, the lower edge convex, the upper nearly straight, with 2-3 low incisures; sori rather long.

This species was first described and figured by Willdenow as *Adiantum cultratum* (Phytogr., 14, pl. 10, fig. 2) after specimens from the Malabar coast, probably from the vicinity of Tranquebar. All south Indian specimens seem to agree very well with his type, and specimens from Himalaya, southern China and Siam are not essentially different. The species is said to be distributed through the whole of tropical Asia, but I have seen no specimens from the Malayan region that agree with the type, although it is possible that the species is to be found there. Most specimens from the Peninsula received as *L. cultrata* belong to the following species. Ridley (p. 22) quotes a large number of localities for *L. cultrata*; I suppose that the majority of them, perhaps all, really belong to

2. **L. Lobbiana** Hook., Spec., 1, 205, pl. 62 C.

L. crenulata Fée, Gen., 105, pl. 28, fig. 2.

Stipe and rachis quadrangular, sulcate above, the furrow with sharp raised edges. Leaf often much longer than that of *L. cultrata*, pinnae about 1 cm. long, the lower side straight or concave, the apex truncate, the upper side with 2-4 rather deep incisures; sori mostly shorter than in *L. cultrata* and extending to the outer edge. This species is apparently common through the Malayan region. Its synonymy is confused, and it is possible that the name chosen cannot stand; the older name *L. lucida* Bl., Enum. 216 (1828) applies perhaps to the same species. Judging from the figures quoted it seems probable that *L. crenulata* Fée, described from a specimen leg. Griffith presumably in Malacca, is identical with *L. Lobbiana*. Both were referred by Kuhn (Ann. Mus. Lugd. Bat. 4, 276) to *L. gracilis* Bl. as a var. *major*, but wrongly, I think, at least if *L. gracilis* Bl. is rightly understood by modern writers as being a species with a wide-creeping rhizome.

L. Lobbiana is apparently common in the Malay Peninsula; the following specimens were all named *L. cultrata.*

PAHANG: Buloh Telang, P. Tioman (Henderson 18587). TRENGGANU: Kuala Berang (Holttum 15332). JOHORE: (A. Vesterdal 26 and 168).

3. **L. concinna** J. Sm.; Hook., Spec., 1, 205, pl. 61 B.

Stipe and rachis quadrangular; pinnae 5-8 mm. long, the lower side mostly straight or convex, the apex bluntly rounded or subacute, the upper edge entire, the sori, therefore, continuous from base to tip, rarely interrupted by a single incisure. Sterile pinnae obtusely toothed or crenate.

This species has been confounded with *L. gracilis*, from which it differs by its short rhizome and tufted leaves. It is known from the Philippine Islands, New Guinea, Borneo and occurs no doubt in the Malay Peninsula. Ridley refers two specimens to it (p. 21) ; his description is adequate.

4. **L. orbiculata** (Lam.) Mett. (*L. flabellulata* Ridley 23).

I mention this polymorphic species here, because the simply-pinnate forms of it often are confounded with the species mentioned above. These smaller forms differ manifestly from the other species by the shape of the pinnae, which are either semicircular or triangular with the sori along the outer edge, the sterile ones acutely dentate, the indusia distinctly toothed. A small specimen from PAHANG: Sungei Perting (Burkill 16574), received under the name *L. cultrata*, belongs here.

B. Rhizome wide-creeping with distant leaves.

5. **L. gracilis** Bl.; v. A. v. R., Handb. 261.

With this species as interpreted by van Rosenburgh I am not acquainted; the specimens so named seen by me I refer to *L. adiantoides* (Bl.) Kuhn. Mettenius and Kuhn united it with *L. concinna* and I am not sure that these authors were wrong, because Mettenius had examined Blume's type. Ridley (p. 22), who takes the species in the sense of v. A. v. R., refers to it a specimen from Negri Sembilan. The long creeping rhizome seems to be the only reliable character.

6. **L. plumula** Ridley, p. 22.

This species is distinct enough from the four species mentioned under group A by its long creeping branched rhizome, and certainly it is not *L. gracilis* v. A. v. R. It agrees with *L. cultrata* by its semiterete stipes and rachis and in shape of pinnae. These are 5-7 mm. long, ascending, the lower edge convex, the upper slightly incised, coriaceous in texture, pale green, the lower and inner edge narrowly involute resembling a strong rib and believed by Ridley to be a rib; the real vein along the lower edge is however not

thicker than in other species. The indusia are broader than in the other species, their uneven edge reaching quite to the margin. The species is no doubt closely related to *L. cultrata*.

Nephrolepis acutifolia (Desv.) Christ.

Negri Sembilan: Seremban (E. S. & G. Hose 5016, received from Kew). This interesting species is in habit and pubescence a Nephrolepis, in sori a Lindsaya. To me it is the type-species of a most distinct genus *Isoloma* J. Sm., which name very unnaturally has been applied to a group of species which may scarcely be separated generically from Lindsaya.

Humata angustata (Wall.) J. Sm. var. **hastata**, n. var.

Fertile leaves 3-8 cm. long, 1 cm. wide, lamina suddenly narrowed and decurrent nearly to the base of the stipe, this 1-1.5 cm. long and with the decurrent wings 1-1.5 mm. broad above; margins broadly lobed about half-way, the lobes irregularly crenate, the basal ones often the largest, 5-8 mm. long, horizontal, the lamina becoming hastate.

PAHANG: G. Kajang, Pulau Tioman (Henderson 18256).

Not knowing similar forms occurring in Borneo, one would be inclined to consider this remarkable plant specifically distinct from *H. angustata*, with which it agrees in scales, texture, colour and sori. It differs chiefly from specimens from Borneo by its small size, short stipe and hastate shape of most leaves. *H. attenuata* and *H. mutata* v. A. v. R., Bull. Jard. Bot. Buitenzorg, III S, 5, 205-206 (1922), are evidently closely related forms and also local derivatives of *H. angustata*.

Humata kinabaluensis Copeland, Philipp. Journ. Sci., 12 C, 48. 1917.

To this species I refer with a little doubt a specimen from Pahang (G. Berumban, Cameron's Highlands, Henderson 17989) named by Mr. Holttum *H. alpina* (Bl.) Moore. It is certainly not that species but agrees very well with Copeland's species from Mt. Kinabalu (Topping 1745, Herb. Copeland!). I have seen two fertile leaves only; they are thickly coriaceous, tripinnatifid at base, the pinnae almost reduced to the thick ribs, each secondary segment bearing 3-4 sori with large indusia. This form resembles much more the genuine *H. botrychioides* Brack. from Polynesia than other Malayan forms wrongly referred to that species.

Microlepia Ridleyi Copeland, Philipp. Journ. Sci., 11 C, 39. 1916.

This species is not mentioned by Ridley, although founded upon a specimen from Pahang collected by himself (no. 14200). I have received from Mr. Holttum a specimen

from the same state (Bentong, Burkill 16699) which corresponds closely to Copeland's description. The surfaces are not glabrous as described by him, but, especially the under side, microscopically puberulous, the hairs not dense. In this it approaches a specimen from Perak (Kunstler 8331) referred by Ridley (p. 32) to *M. Kurzii* (Clarke) Bedd. It does not belong to that species, of which I have what I consider a typical specimen from Burma, and which is, in a few words, a densely hairy *M. platyphylla*. Kunstler's specimen has the pinnules pinnatifid almost to the costules and the whole underside is very densely puberulous with short erect hairs mixed with some longer ones on the ribs. Mr. Holttum is of opinion that it is a form of *M. Ridleyi*, and perhaps he is right, but certainly it is the same as *M. Brooksii* Copeland from Sumatra, and probably also identical with *M. puberula* v. A. v. R. All seem to be forms of a single species.

Microlepia speluncae (L.) Moore., var. **villosissima** n. var.

The whole frond, especially beneath, very densely villous with grey shorter and longer hairs mixed together, the longer hairs prevailing on the upper side. Probably a distinct species.

PAHANG: Pulau Tioman (Henderson 18873, Herb. C. Chr.).

Saccoloma minus (Hook) C. Chr. comb. nov.

Microlepia alata J. Sm., Hook. Journ. Bot., 3,416. 1841. (nomen).

Davallia inaequalis var. *minor* Hook., Spec. Fil., 1,180, pl. 58 A. 1846.

Saccoloma moluccanum Mett.; C. Chr., Ind.

Dennstaedtia Kingii Bedd., Handb. Suppl., 6. Ridley 10.

PERAK: Larut (Kunstler 2118, cotype of *D. Kingii* Bedd.) ; Maxwell's Hill (Haniff 9083).

By his researches in Blume's herbarium in Leiden, Prof. Rosenstock has proved that Mettenius was mistaken in identifying *Microlepia alata* J. Sm., based on Cuming no. 119, and first described and figured by Hooker, with *Davallia moluccana* Bl.; the great bulk of specimens by Blume so named are identical with *Davallia amboynensis* Hook.= *Tapeinidium amboynensis* (Hook.) C. Chr. Ind. 631, which species subsequently must be named **Tapeinidium moluccanum** (Bl.) C. Chr. comb. nov. A single specimen in Blume's herbarium, and the only one seen by Mettenius, was with doubt referred by Blume himself to *D. moluccana*; it is thus the type of *Saccoloma moluccanum* Mett. I have a fragment of it, kindly sent by Prof. Rosenstock, and it agrees so closely with the two specimens from Perak that it may scarcely be

doubted that *Dennstaedtia Kingii* Bedd. is the same thing. Apparently it differs in indusial characters from Saccoloma, the indusium being cup-shaped, scarcely at all two-lipped, often protruding beyond the margin, and reflexed as in several species of Dennstaedtia, but the inner valve is distinctly attenuate towards the base, as in Saccoloma, and the whole habit with the characteristic unequal sided pinnae and pinnulae, is entirely that of that genus.

In Blume's specimen the indusia are slightly two-lipped, but materially not different. From this Malayan type several of the Polynesian forms commonly referred to the same species are considerably different.

Asplenium scolopendroides J. Sm.

PAHANG: Pulau Tioman, (Henderson 18763).

Easily distinguished from other simple-fronded species by the characteristic vein-like rim running parallel to the sori between two real veins. The specimen from P. Tioman agrees closely with the type at Kew (Cuming 318), well illustrated by Hooker (Ic. Plant., pl. 930), though the venation is not accurately shown.

Asplenium dimidiatum Sw.

To this species Ridley (p. 46) refers a couple of specimens, of which I have seen that from Singapore. It is not at all *A. dimidiatum*, which is certainly not found in Asia, but it is difficult to say what the scanty specimen may be. It may be, as suggested by Beddome, a form of *A. adiantoides* (L.) C. Chr. (=*A. falcatum* Lam.), or perhaps of *A. nigrescens* Bl.

Asplenium normale Don.

Some of the specimens referred by Ridley to *A. lunulatum*, at least Kunstler 8043, belong here. The genuine *A. lunulatum* Sw. certainly does not occur in the Malayan region; whether any of the many species related to it occurs in the Peninsula I do not know.

Asplenium perakense Matthew et Christ; Ridley 47.

The specimen from Pahang quoted by Ridley (Holttum 11385) agrees excellently with Christ's description and is no doubt rightly named. It falls under *A. praemorsum* Sw. taken in a wide sense, but seems to be a distinct form worthy of specific rank. In gross characters it scarcely differs from other forms of *A. praemorsum*, but its scales seem to mark it sufficiently. They are of a pure brown, peltate, triangular-long-acuminate but not hair-pointed, slightly toothed at base, entire upwards, very finely reticulated but not clathrate; they differ widely from those of the Indian form of *A. praemorsum*, which are blackish, clathrate, shortly ciliate and hair-pointed.

Asplenium spathulinum J. Sm., Hook. Journ. Bot., 3, 408. 1841.

A. cuneatum Ridley 48.

A. affine auctt., quoad plant. asiat.

PERAK: Bujong Malacca (Ridley 9546). PAHANG: Sedagong, P. Tioman (Henderson 18898).

The two specimens quoted match perfectly the type (Cuming 210, Kew!) and their resemblance to the true *A. cuneatum* Sw. of the West Indies is superficial only. The species is much closer allied to *A. affine* Sw. from the Mascarene Islands, but I think it is specifically different, being marked by the obtuse, erosodentate outer edge of the cuneate pinnules and by not being proliferous.

A. cuneatum var. *affine* Ridley (p. 48) from Perak (Kunstler 2228) is to me a tripinnate form of *A. spathulinum*. All these Asplenia differ very much in the degree of cutting.

Diplazium xiphophyllum (Bak.) C. Chr.

This species, founded upon a poor specimen from Borneo (Burbidge, Kew!) is apparently not rare in the Peninsula, but probably often confounded with *D. bantamense*, from which it differs chiefly by its narrower and much longer pinnae, often 40-45 cm. long, 3-3.5 cm. wide, terminating in a very long subulate apex.

Perak: G. Hijau (Burkill 12663). Pahang: Ulu Chineras (Burkill 15692). The former specimen differs from the type by the pinnae being irregularly double-crenate throughout; the latter by the lower pinnae being subcuneate at base; it matches nearly exactly *D. palauanense* Copeland, which I refer to *D. xiphophyllum*.

Diplazium sorzogonense Pr. and related forms.

This group of bipinnatifid species is extremely difficult, and the various forms are hopelessly mixed together in all herbaria. The material at hand from the Malay Peninsula may naturally be sorted into two species, *D. sorzogonense* and *D. speciosum* of Ridley (p. 51-52). They may briefly be characterized as follows:

Diplazium malaccense Presl, Epim. 86. 1849. Fée, Gen. 213, pl. 17 D, fig. 1.

D. Schkurii J. Sm., Hook. Journ. Bot., 3, 407 (nomen).

Asplenium Schkurii Mett., Aspl. no. 208.

Diplazium acuminatum Bl., Enum., 193. 1828?. v. A. v. R., Mal. Ferns, 409 (p. p.?). (not Raddi).

D. Christii C. Chr., Ind. 229. 1905 (p. p.?)

D. speciosum Ridley, 52 (entirely or partly).

Rachis and costae beneath naked or very slightly scaly; pinnae 2 cm. wide, cut 1/2—2/3 of the way to the costa, oblique, oblong, 5 mm. broad, truncate, entire or slightly dentate at the apex; veins simple, 6-7-jugate; the anterior basal sorus diplazioid.

PAHANG: Fraser Hill (Nur 10508). NEGRI SEMBILAN: Bukit Putus (E. S. & G. Hose 174, received from Kew).

Diplazium sorzogonense Presl.

Stipe, rachis and costae beneath more or less densely fibrillose with narrow brown or castaneous scales; pinnae 2-5 cm. broad, cut down to a wing 3-4 mm. broad into subhorizontal oblong obtuse segments 4-5 mm. broad and finely serrate throughout or at the outer part only; veins simple, 10-11-jugate; diplazioid sori rarely found.

MALAY PENINSULA: (W. Norris 637, Herb. Copenhagen). PAHANG: G. Tahan (Nur. 7953); G. Rokam, P. Tioman (Henderson 18612).

D. speciosum Bl. is referred by most authors to *D. sorzogonense*, but considered distinct by v. A. v. R.; if rightly I dare not now express an opinion.

Diplazium crenato-serratum Bl.

D. larutense Bedd. (Ridley 50) is probably a form of this species. I have not seen the type, but a specimen from Negri Sembilan (Holttum 9775) is said by Mr. Holttum to resemble the type of *D. larutense*, and it is to me very typical *D. crenato-serratum*. In a collection from Sumatra are found among typical leaves some that correspond closely to Beddome's description, especially by the broadly rounded tips of the pinnae.

Polypodium subevenosum Baker.

P. Maxwellii Baker, Kew Bull., 1893, 211.

? *P. kinabaluense* Copeland, Philipp. Journ. Sci., 12 c, 60. 1917.

Mr. Holttum has sent me specimens from Penang, which he has compared with the type specimen at Kew and declares to be typical. As in the type some veins are produced and forked. The same specimens further fully agree with the type of *P. Maxwellii* Bak. from Borneo (Hose 296, Kew!) and with several other Bornean specimens recently examined; and *P. kinabaluense* Copel. from Mt. Kinabalu (Mrs. Clemens 10649, Herb. Copeland!) seems to me the same. The differential character of short, simple, or produced forked veins is not a stable one. More different from the type is a specimen from Pahang (G. Kajang, P. Tioman, Henderson 18944; herb. Singapore). It is larger; leaves 10-12 cm. long by 0.5 cm. wide, all veins forked and the sori distinctly oblong, almost linear and somewhat immersed. This form evidently approaches the genuine *P. sessilifolium* Hook.=*P. malaicum* v. A. v. R. (Handb. 577) a Philippine plant that may be different from *P. subevenosum* (t. Holttum). *P. subevenosum* var. *sessilifolium* Ridley (p. 81) is certainly *P. subevenosum*.

Polypodium minutum Bl., Enum. 130; Fl. Javae 188, pl. 87 D.

P. callophyllum C. H. Wright, Kew Bull., 1909, 362. Ridley 83.

PERAK: Gunong Hijau (C. G. Matthew, herb. Kew!).

I do not hesitate to refer this specimen to *P. minutum* Bl.; it agrees very perfectly with Blume's figure. In habit it resembles not a little *P. consociatum* from the same locality, differing from it by the oblong fertile segments, which are repand-crenate at the upper edge, and by the presence of two sori in several segments, one near its base, another in the outer half; sporangia mixed with many long hairs. Leaf grass-green, thin.

Polypodium consociatum v. A. v. R., Bull. Jard. Buitenzorg, II S, VII, p. 41, pl. 4, fig. 1. 1912. Handb. Suppl., 352.

Plectopteris gracilis Fée, Gen. 230, pl. 19B.

Calymmodon hirtus Brack., U. S. Expl. Exp., 16, 2.

Polypodium cucullatum Ridley 82 (pro parte?). (an Bedd. Handb. 307).

PERAK: Gunong Hijau, 3000 ft. (C. G. Matthew 925).

I have seen the only specimen quoted, but likely most or all of those quoted by Ridley under *P. cucullatum* belong to the same species that is abundantly different from *P. cucullatum*. The said specimen is perfectly identical with a beautiful lot of specimens from Mt. Dulit, Borneo (Mjoberg), which Prof. Copeland has named for me, giving the synonyms cited above. His identification may be right, but figures of Fée and v. A. v. R. do not show the characteristic shape of the upper fertile segments of my specimens; they are normally flat, rarely folded, and almost circular with a central sorus.

Polypodium Leysii Baker, Journ. Bot. 1879, 66.

Prosaptia semicrypta Copeland, Philipp. Journ. Sci., 9 C, 231. 1914.

Polypodium semicryptum C. Chr., Ind., Suppl. prél. 1912-16, 28.

PAHANG: Teku, G. Tahan (Haniff & Nur 8066); G. Rokam, P. Tioman (Henderson 18777).

The specimens were received from Mr. Holttum under the names *P. obliquatum* (8066) and *P. contiguum* var. (18777); they are nevertheless identical and agree perfectly with the type specimens of *P. Leysii* Baker from Sulu Archipelago, leg. Burbidge (Kew!) and of *Prosaptia semicrypta* Copel. from Benkoelen, Sumatra, leg. C. J. Brooks. (no. 93, Herb. Copeland!). The species is intermediate between *P. obliquatum* Bl. and *P. contiguum* (Forst.) differing from the former by the narrower, repand-crenate segments with submarginal sori; these sunk in deep cavities with raised, naked edges ("craters"), the craters oblique with the mouths nearly round. The genuine *P. obliquatum*

has broader, entire segments with the sori not close to the edge, the craters oblong; the genuine Polynesian *P. contiguum* (Forst.) (Davallia Ind. Fil.) has marginal sori with the craters protruding beyond the edge. Both species occur in the Malay Peninsula, but it seems probable that some specimens at least referred to them belong either to *P. Leysii* or to *P. Burbidgei* Bak., with which species *P. decipiens* Kuhn=*P. cryptosorum* C. Chr. (Ridley 84) must be united.

All these species are members of a narrow group of closely related species, some of which form the genus Prosaptia, very improperly referred by several authors, and in my Index, to Davallia as a subgenus, others belonging to Eupolypodium, forming a specialized group, *Cryptosorus*. All modern pteridologists agree, I think, in uniting Cryptosorus with Prosaptia, and either restore Prosaptia as a genus, or make it a subgenus of Polypodium. The alliance with Davallia is the furthest possible. To Prosaptia also belongs *P. barathrophyllum* Bak., found in Perak by Bishop Hose (Kew!); it is doubtfully different from *P. khasyanum* Hook.

Polypodium mollicomum Nees et Bl.

P. fuscatum Ridley, l. c. 84 (and also Blume?).

P. malaccanum Bak., Ann. Bot. 5, 129. Ridley. l. c. 84 (excl. var.)

A co-type specimen of *P. malaccanum* Bak. from Gunong Mering (Ridley 3345, Herb. Singapore) is to me typical *P. mollicomum*. It differs from the following species by the more or less coriaceous leaves with indistinct veins, and with both surfaces throughout setose with rather short dark brown hairs.

Polypodium brevivenosum v. A. v. R., Bull. Jard. Bot. Buitenzorg, II S, XXVIII, 40. 1918. (ex descr.)

P. malaccanum var. *pahangense* Ridley, l. c. 84.

PAHANG: (Herb. Singapore 8147, 15974, 17744).

Mr. Holttum has identified these specimens with *P. brevivenosum* from Sumatra, and I believe rightly. The species very much resembles in size and cutting *P. mollicomum*, but the leaves are thinner, the short lateral simple veins clearly visible, of a lighter colour, and the pubescence different; margins ciliated with long reddish hairs and few similar ones are scattered over the surfaces. Also the scales of the rhizome are much more numerous and conspicuous, light-castaneous, lanceolate, entire. I have the same species from Sarawak.

Polypodium sarawakense Baker, Journ. Linn. Soc., 22, 228. 1886.

Pleopeltis superficialis var. *latifrons* Bedd., Journ. Bot., 31, 226.

Pl. peltata Scort.; v. A. v. R., Handb. Suppl. 376 Ridley l. c. 91.

Polypodium peltatum v. A. v. R., Handb. 632.

PERAK: Larut (Kunstler 2180).

Perfectly identical with specimens from Borneo. The rhizome of *P. sarawakense* Bak. (type in Kew!) is not naked as described by Baker, but clothed with easily deciduous almost orbicular blackish scales with brown edges, just as described by v. A. v. R. under his *P. peltatum*.

Polypodium regulare Mett., C. Chr., Ind. 558.

Gymnogramme campyloneuroides Bak., Journ. Linn. Soc. Bot., 24, 261. 1887.

Selliguea campyloneuroides Bedd., Handb. Suppl., 101.

Polypodium Hosei C. Chr., Ind. 534.

PAHANG: Sedagong, Pulau Tioman (Henderson 18895).

A comparison of the type-specimen of *P. regulare* Mett. (Borneo, Korthals, Herb. Leiden) and *G. campyloneuroides* Bak. (Sarawak, Hose 208, Kew) shows that they are absolutely identical. In his Handb. Suppl., p. 404, v. A. v. R. has reduced both *P. regulare* and *P. selliguea* Mett. (=*Selliguea membranacea*) to forms of *P. macrophyllum* Bl., and he may be right. In Ridley's paper this species is placed by error under Syngramma (p. 105).

Polypodium heterocarpum Bl., Fl. Javae, Fil., 167, pl. 75.

P. Zollingerianum Kunze; C. Chr., Ind. 575.

Pleopeltis Zollingeriana Moore. Ridley 93.

Nephrodium pteropodum Baker, Journ. Bot., 1888, 325.

Aspidium pteropodum Diels; C. Chr., Ind. 662

Polypodium Scortechinii Bak., Ann. Bot., 5, 477.

Pleopeltis Scortechinii Beddome, Handb. Suppl., 95. Ridley 93.

I have examined both the type specimen of *N. pteropodum* Bak. from Sarawak (Kew!) and a co-type specimen of *P. Scortechinii* from Perak (Scortchini 216, Herb. Singapore) and find them perfectly identical. Both agree closely with Blume's figure of his *P. heterocarpum*, and I do not hesitate to reduce both names to synonyms of that species. According to modern rules of nomenclature this species must be named *P. heterocarpum* Bl.; *P. heterocarpum* (Bl.) Mett. (C. Chr., Ind.) must be called *P. Mettenianum* Cesati or *Selliguea heterocarpa* Bl.

Loxogramme subecostata (Hook.) C. Chr. comb. nov.

Polypodium subecostatum Hook., Spec., 5, 59, pl. 283 A.

Loxogramme Brooksii Copeland, Philipp. Journ. Sci., 9 C, 232. 1914; 11 C, 44, pl. 2 fig. 6. 1916.

PAHANG: Sedagong, Pulau Tioman (Henderson 18896).

An examination of the type-specimen of *P. subecostatum* Hook. in Kew from Sarawak, leg. Lobb, has shown that it is a genuine Loxogramme. Hooker's figure does not show the young linear submarginal slightly immersed sori, nor the velutinous roots so characteristic of this genus. *L. Brooksii* Copel. from Sumatra is certainly the same. It is probable that Ridley referred specimens belonging here to *L. lanceolata* (p. 104), under which name the specimen quoted was received. The species differs from *L. lanceolata* by its smaller size, much more coriaceous texture and the short sori being placed nearer the margin than the obscure midrib.

Cyclophorus angustatus Desv.

To this species belong probably the sterile specimens from Perak (Kunstler 8275) referred by Beddome and Ridley (p. 98) to *C. heteractis* C. Chr., which species consequently is not known from the Peninsula.

Cyclophorus varius Gaud.

C. pannosus Ridley 98.

SINGAPORE: Kranji (Ridley 6919, not 6419 as quoted by Ridley).

This specimen wrongly referred to *C. pannosus* by Ridley was rightly renamed *C. varius* by Holttum.

SCLEROGLOSSUM v.A.v.R.

This small genus was created by van Rosenburgh in 1912 (Bull. Jard. Buitenzorg, II S, XII, 39) and he referred to it three species: *S. debile*, *S. pusillum* and *S. sulcatum*, all previously considered species of Vittaria. The genus is very remotely, if at all, related to Vittaria, and forms with its sister-genus *Cochlidium* Klf. (Pleurogramme auctt.) of Tropical America, a distinct tribe of ferns, presumably of high age. The woody-coriaceous leaves, which are not articulated to the rhizome and apparently long-living, the peculiar light brown thin scales of the rhizome, hidden among the densely tufted leaves, lack of paraphyses, venation, and other characters make these species totally different from all Vittarieæ. I shall discuss this genus in another paper, and here confine myself to mentioning briefly the species known from the Malay Peninsula. All species described are very closely related, and might naturally be regarded as forms of a single species.

Scleroglossum debile (Mett.) v.A.v.R., l.c.

Vittaria debilis Mett.; Kuhn, Linnaea, 36, 67. 1869.

The smallest species; leaves rarely more than 3 cm. long, 1.5 mm. wide; veins simple; the sori short, near the

tip, not very deeply immersed, distinctly inframedial, the leaf edge outside the soral groove mostly broader than the costal parenchyma. Probably a small form of *S. pusillum*.

JOHORE: Gunong Panti (Holttum 17493). BORNEO.

Scleroglossum pusillum (Bl.) v.A.v.R., l.c.

Vittaria pusilla Bl. Ridley 108.

Leaves 5-10 cm. long, 3-4 mm. wide; veins forked or irregularly branching; sori in the upper third of the lamina, distinctly intramarginal, the inner edge of the soral groove acute and somewhat produced, the outer attenuate towards the edge and generally half as broad as the costal parenchyma. In specimens of this species one often finds scattered stellate brown hairs on the lamina; they are very deciduous and occur probably in all species.

MALACCA: Mt. Ophir (Ridley 9864). Singapore. Penang. Scattered through the Malayan region.

var. **intermedium** (Copeland)

Monogramme intermedia Copeland, Philipp. Journ. Sci., 1 Suppl., 255. 1906.

Intermediate between the type and *S. debile*, resembling the former in size, the latter by the inframedial sori with the leaf-edge beyond the soral groove about as wide as the parenchyma but thicker than in *S. debile*.

PERAK: (Scortechini). Philippines.

Scleroglossum crassifolium (Baker) C. Chr. comb. nov.

Vittaria crassifolia Baker, Kew Bull., 1893, 212.

V. sulcata Ridley, 108 (pro parte?)

Leaves up to 20 cm. long, 4-6 mm. wide, sometimes still larger, the upper half fertile, linear and generally narrower than the lower sterile half. Mouth of the soral groove marginal with the leaf edge not or very slightly protruding beyond the sorus. It is no doubt this form Ridley calls *V. sulcata*, which is a Ceylonese form with a distinct thick leaf-edge outside the sori; it is very doubtfully different from *S. pusillum*.

SELANGOR: (Ridley). BORNEO.